Center Innovation Fund: KSC CIF

Microbes Eating Rocket Propellant Hypergols (MERPHS)

Completed Technology Project (2017 - 2019)

Project Introduction

Microbes will be attempted on proprietary green propellants. Evaluation and selection of optimal microbial media will be determined. Alteration of microbial candidates may be implemented to increase conversion rates and production of alternative-use products. Successful conversion of fuel to non-explosive compounds will be determined by classical assay analysis techniques already performed per GPIM fuel specifications. Success is measured by the chemical analysis showing no more of the fuel molecules to be present in their previous form. Current industrial methods utilize mere water dilution upon immediate release, but that can lead to expensive environmental clean-ups, and even if captured, costly industrial wastewater permits and monitoring, routine sampling and analysis have to be conducted. Other typical costly disposal includes detonation events with other unexploded ordnance at facilities permitted to do so or reactive hazardous waste disposal to out-of-state treatment facilities.

Anticipated Benefits

Determine safe handling methodology for "Green Propulsion" alternative rocket fuels (alternatives to hydrazine and other hypergols) in such situations as spills, off-spec fuels, and emergency situations; developing and testing a new, unique microbial process to chemically alter the explosive molecules, rather then temporary dilution. Current State of the Art (SOA) technology methods attempted or involved use either chemical neutralization or simple dilution with water. Both of which result in undesirable situations: chemical neutralization releases toxic gases or creates reversible reactions where the explosive can be regenerated; water dilution eventually reverts back to an explosive hazard with the evaporation of the water.

Microbes Eating Rocket Propellant Hypergols

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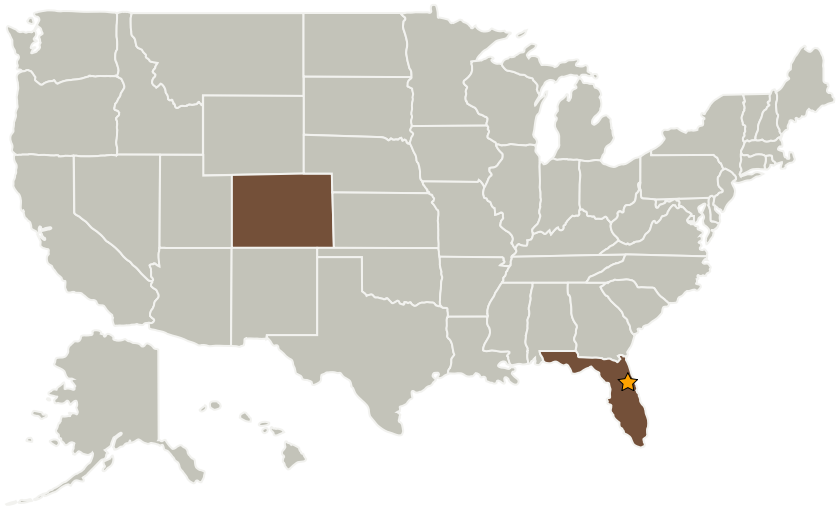
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
Ball Aerospace & Technologies Corporation	Supporting Organization	Industry	Boulder, Colorado

Co-Funding Partners	Type	Location
Office of Safety and Mission Assurance(OSMA)	NASA Office	

Primary U.S. Work Locations	
Colorado	Florida

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

Center Innovation Fund: KSC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

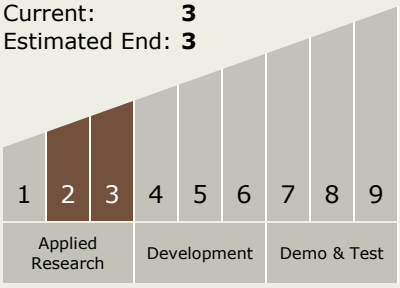
Barbara L Brown

Principal Investigator:

Douglas J Tomlin

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.6 Gels

Target Destination

The Moon